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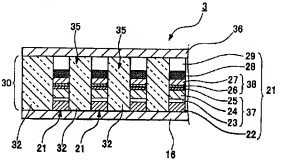
(54)【発明の名称】　有機ＥＬ素子及びその製造方法、並びに表示装置

(57)【要約】
【課題】　光透過部分の透過率が高く、表示装置の照明手段に用いて好適な有機ＥＬ素子、及びこの有機ＥＬ素子を容易かつ歩留まり良く製造する方法を提供する。
【解決手段】　本発明は、支持基板１６と、該支持基板１６上に設けられた素子部３０とを備え、前記素子部３０が、陽極２２と、有機ＥＬ材料を含む発光層３７と、陰極３８とを順に積層して含み、当該有機ＥＬ素子の被照明体を透過して表示するために前記素子部３０を貫通して形成された開口部３５と、前記被照明体を照明する発光部２１とが、前記素子部３０に備えられたフロントライト（有機ＥＬ素子）３、及びその製造方法を提供する。



【特許請求の範囲】
【請求項１】　支持基板と、該支持基板上に設けられた素子部とを備え、
前記素子部が、陽極と、有機ＥＬ材料を含む発光層と、陰極とを順に積層して含む有機ＥＬ素子であって、
当該有機ＥＬ素子の被照明体を透過して表示するために前記素子部を貫通して形成された開口部と、前記被照明体を照明する発光部とが前記素子部に備えられたことを特徴とする有機ＥＬ素子。
【請求項２】　前記開口部が、前記素子部をパターニングすることにより形成されたものであることを特徴とする請求項１に記載の有機ＥＬ素子。
【請求項３】　前記開口部の平面積が、当該有機ＥＬ素子の表示領域の８０％以上とされたことを特徴とする請求項１又は２に記載の有機ＥＬ素子。
【請求項４】　前記発光部の形状が、平面視略ストライプ状とされたことを特徴とする請求項３に記載の有機ＥＬ素子。
【請求項５】　前記発光部の形状が、平面視略格子状とされたことを特徴とする請求項３に記載の有機ＥＬ素子。
【請求項６】　前記支持基板の素子部側に一対の実装端子が形成されており、
前記実装端子の一方が、前記発光部の陽極に接続されており、前記実装端子の他方が、前記発光部の側面側に沿って設けられた導通電極を介して前記陰極に接続されていることを特徴とする請求項１ないし５のいずれか１項に記載の有機ＥＬ素子。
【請求項７】　前記素子部の前記支持基板と反対側に、保護基板が設けられており、
前記支持基板の内面側、及び前記保護基板の内面側にそれぞれ実装端子が形成され、前記支持基板内面側の実装端子と、前記発光部の陽極とが接続されており、前記保護基板内面側の実装端子と、前記陰極とが接続されていることを特徴とする請求項１ないし５のいずれか１項に記載の有機ＥＬ素子。
【請求項８】　前記素子部の前記支持基板と反対側に、保護基板が設けられ、該保護基板の内面側に一対の実装端子が形成されており、
前記実装端子の一方が、前記陰極に接続され、前記実装端子の他方が、前記発光部の側面側に沿って設けられた導通電極を介して前記陽極に接続されていることを特徴とする請求項１ないし５のいずれか１項に記載の有機ＥＬ素子。
【請求項９】　前記発光部の陰極の外側に、導電性を有する遮光層が形成されており、前記遮光層を介して、前記陰極と前記支持基板又は保護基板の実装端子とが接続されていることを特徴とする請求項６ないし８のいずれか１項に記載の有機ＥＬ素子。
【請求項１０】　前記開口部に透光性の樹脂材料が充填されたことを特徴とする請求項１ないし９のいずれか１項に記載の有機ＥＬ素子。
【請求項１１】　支持基板と、該支持基板上に設けられた素子部とを備え、前記素子部が、陽極と、有機ＥＬ材料を含む発光層と、陰極とを順に積層して含む有機ＥＬ素子の製造方法であって、
支持基板上に前記素子部を形成する工程と、
前記素子部をパターニングすることで、前記素子部を貫通する所定形状の開口部を形成する工程と、
を含むことを特徴とする有機ＥＬ素子の製造方法。
【請求項１２】　支持基板と、該支持基板上に設けられた素子部とを備え、前記素子部が、陽極と、有機ＥＬ材料を含む発光層と、陰極とを順に積層して含む有機ＥＬ素子の製造方法であって、
支持基板上に陽極と、発光層と、陰極とを積層して含む素子部を形成する工程と、
前記素子部上にフォトレジストを塗布する工程と、
前記素子部上に形成されたフォトレジストを所定形状にパターニングする工程と、
前記レジストの形状に沿って、前記素子本体部をパターニングすることにより前記開口部を形成する工程と、
を含むことを特徴とする有機ＥＬ素子の製造方法。
【請求項１３】　前記フォトレジストを、導電性及び遮光性を有する感光性樹脂材料で形成することを特徴とする請求項１２に記載の有機ＥＬ素子の製造方法。
【請求項１４】　前記支持基板上に、実装端子を形成する工程を含み、
前記支持基板上に形成された実装端子を部分的又は全体的に覆うように前記素子部又は素子部を形成することを特徴とする請求項１１ないし１３に記載の有機ＥＬ素子の製造方法。
【請求項１５】　前記素子部をパターニングする工程において、イオンミリング法により前記開口部を形成することを特徴とする請求項１１ないし１４に記載の有機ＥＬ素子の製造方法。
【請求項１６】　前記素子部をパターニングする工程において、レーザーアブレーション法により前記開口部を形成することを特徴とする請求項１１ないし１４に記載の有機ＥＬ素子の製造方法。
【請求項１７】　請求項１ないし１０のいずれか１項に記載の有機ＥＬ素子を含む照明手段と、該照明手段から出射される光を反射表示に用いる表示手段と備えたことを特徴とする表示装置。
【請求項１８】　前記表示手段が、反射型液晶表示装置とされ、前記照明手段を成す前記有機ＥＬ素子の陰極が、前記反射型液晶表示装置の非開口領域に対応して配置されていることを特徴とする請求項１７に記載の表示装置。
【発明の詳細な説明】
【０００１】

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(54) ORGANIC EL ELEMENT AND MANUFACTURING METHOD OF THE SAME, AND DISPLAY DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an organic EL element having high transmittance at light transmitting part, suitable as a lighting means of a display device, and to provide a method of easily manufacturing the EL element with a good yield.
SOLUTION: The front light (organic EL element) 3 has a supporting substrate 16 and an element part 30 formed by successively laminating a positive electrode 20, a light emitting layer 37 including organic EL material, and a negative electrode mounted on the supporting substrate 16; and an opening

part 35 formed so as to penetrate through the element part 30 in order to display by transmitting through part of the organic EL element to be lighted, and a light emitting part 21 lighting the part of the organic EL element to be lighted are formed to the element part 30.

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CLAIMS

[Claim(s)]
[Claim 1] The organic EL device characterized by to be equipped said component section with the light-emitting part which is equipped with a support substrate and the component section which were prepared on this support substrate, and illuminates opening formed by penetrating said component section in order are the organic EL device with which said component section carries out the laminating of an anode plate, the luminous layer containing an organic-electroluminescence ingredient, and the

cathode to order, and includes it in it and to penetrate and display the illuminated body of the organic EL device concerned, and said illuminated body.

[Claim 2] The organic EL device according to claim 1 characterized by forming said opening by carrying out patterning of said component section.

[Claim 3] The organic EL device according to claim 1 or 2 with which the plane area of said opening is characterized by being carried out to 80% or more of the viewing area of the organic EL device concerned.

[Claim 4] The organic EL device according to claim 3 with which the configuration of said light-emitting part is characterized by considering as the shape of a plane view abbreviation stripe.

[Claim 5] The organic EL device according to claim 3 with which the configuration of said light-emitting part is characterized by considering as the shape of a plane view abbreviation grid.

[Claim 6] An organic EL device given in claim 1 characterized by forming the mounting terminal of a pair in the component section side of said support substrate, connecting one side of said mounting terminal to the anode plate of said light-emitting part, and connecting another side of said mounting terminal to said cathode through the flow electrode prepared along with the side-face side of said light-emitting part thru/or any 1 term of 5.

[Claim 7] The protective group plate is formed in said support substrate and opposite side of said component section, and a mounting terminal is formed in the inside [of said support substrate], and inside side of said protective group plate, respectively. The mounting terminal by the side of said support substrate inside, An organic EL device given in claim 1 characterized by connecting the anode plate of said light-emitting part, and connecting the mounting terminal by the side of said protective group plate inside, and said cathode thru/or any 1 term of 5.

[Claim 8] A protective group plate is formed in said support substrate and opposite side of said component section, and the mounting terminal of a pair is formed in the inside side of this protective group plate. An organic EL device given in claim 1 characterized by connecting one side of said mounting terminal to said cathode, and connecting another side of said mounting terminal to said anode plate through the flow electrode prepared along with the side-face side of said light-emitting part thru/or any 1 term of 5.

[Claim 9] An organic EL device given in claim 6 characterized by forming in the outside of the cathode of said light-emitting part the protection-from-light layer which has conductivity, and connecting the mounting terminal of said cathode and said support substrate, or a

protective group plate through said protection-from-light layer thru/or any 1 term of 8.

[Claim 10] An organic EL device given in claim 1 characterized by filling up said opening with the resin ingredient of translucency thru/or any 1 term of 9.

[Claim 11] It has a support substrate and the component section prepared on this support substrate. Said component section An anode plate, By the process which is the manufacture approach of the organic EL device which carries out the laminating of the luminous layer containing an organic electroluminescence ingredient, and the cathode to order, and includes them in it, and forms said component section on a support substrate, and carrying out patterning of said component section The manufacture approach of the organic EL device characterized by including the process which forms opening of the predetermined configuration which penetrates said component section.

[Claim 12] It has a support substrate and the component section prepared on this support substrate. Said component section An anode plate, It is the manufacture approach of the organic EL device which carries out the laminating of the luminous layer containing an organic electroluminescence ingredient, and the cathode to order, and includes them in it. On a support substrate An anode plate, The process which forms the component section which carries out the laminating of a luminous layer and the cathode, and includes them, and the process which applies a photoresist on said component section, The manufacture approach of the organic EL device characterized by including the process which carries out patterning of the photoresist formed on said component section to a predetermined configuration, and the process which forms said opening by carrying out patterning of said component body section in accordance with the configuration of said resist.

[Claim 13] The manufacture approach of the organic EL device according to claim 12 characterized by forming said photoresist with the photopolymer ingredient which has conductivity and protection-from-light nature.

[Claim 14] Claim 11 characterized by forming said component section or the component section so that the mounting terminal formed on said support substrate may be covered partially or on the whole including the process which forms a mounting terminal on said support substrate thru/or the manufacture approach of an organic EL device given in 13.

[Claim 15] Claim 11 characterized by forming said opening by the ion milling method in the process which carries out patterning of said component section thru/or the manufacture approach of an organic EL device given in 14.

[Claim 16] Claim 11 characterized by forming said opening by the laser

ablation method in the process which carries out patterning of said component section thru/or the manufacture approach of an organic EL device given in 14.

[Claim 17] The display characterized by having with the lighting means which contains the organic EL device of a publication in claim 1 thru/or any 1 term of 10, and a display means to use for a reflective display the light by which outgoing radiation is carried out from this lighting means.

[Claim 18] The display according to claim 17 with which said display means is used as a reflective mold liquid crystal display, and cathode of said organic EL device which constitutes said lighting means is characterized by being arranged corresponding to the non-opening field of said reflective mold liquid crystal display.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention is allotted to an organic electroluminescence (Electro-Luminescence, EL) component and its manufacture approach, and a list about a display at the front-face side of an irradiated object, and relates to the suitable organic EL device for the application which penetrates and displays an irradiated object, and its manufacture approach.

[0002]

[Description of the Prior Art] In recent years, the thing using the organic EL device as a front light (lighting system) of the display of a nonluminescent mold like a reflective mold liquid crystal panel attracts attention, and using an organic EL device as a display of a spontaneous luminescence mold is also considered only as a lighting system. The basic configuration of an organic EL device is the structure where the laminating of a transparent electrode (anode plate), a luminous layer, and the metal electrode (cathode) was carried out for example, on the glass substrate, the big ingredient of a work function is used for an anode plate, the small ingredient of a work function is used for cathode, and the organic electroluminescence ingredient is used for the luminous layer. And light is emitted when the electron hole and electron which are poured into a luminous layer from both electrodes recombine by the luminous layer.

[0003]

[Problem(s) to be Solved by the Invention] By the way, when using an organic EL device as a display for a display, the metal electrode used as cathode

can be formed on a substrate, and it can consider as the configuration checked by looking from the transparent electrode side which turns into an anode plate on both sides of a luminous layer. In this case, cathode will end, if it forms over the whole surface on a substrate, and it becomes unnecessary [patterning]. On the other hand, in using, for example as a front light of a display, in order to check a display by looking, it does not go to the reason for forming the cathode which consists of a metal electrode over the whole surface, but patterning is needed. Although patterning of the cascade screen which consists of alkaline earth metals, such as calcium which forms in the whole surface the transparence electric conduction film which constitutes an anode plate, and constitutes cathode, and metals, such as aluminum, will be carried out using dry etching etc. when it constitutes a front light from an organic EL device of such a configuration In order to carry out patterning of the light-emitting part of an organic EL device Complication of the equipment and the process accompanying the increment in the class of etchant used is not avoided from it being necessary to use etchant which etches two or more layers from which a component differs and which is different for each class for the ability folding, and to also take into consideration the resistance of each class to each etchant.

[0004] Moreover, in the above-mentioned organic EL device, in order to raise the electron injection effectiveness from cathode to a luminous layer, to maintain the stability as cathode and to secure a reflection factor, alkaline earth metal, such as small calcium (calcium) of a work function and Mg (magnesium), and the case where the laminating electrode which consists of metals, such as large aluminum (aluminum) of a work function and Ag (silver), is used for cathode rather than this are increasing. And since the activity of alkaline earth metal, such as calcium contained in this cathode, was high, and patterning of an alkaline-earth-metal layer was difficult, the problem of being difficult had also manufactured the organic EL device with the sufficient yield.

[0005] Furthermore, in order to reduce the complexity of the above patterning processes, forming in the whole surface the anode plate which can be constituted from a translucency ingredient has accomplished, but if it is such a configuration, when using as a front light, decline in permeability will not be avoided.

[0006] This invention is made in order to solve the above-mentioned technical problem, its permeability of a light transmission part is high, and it sets to use for the lighting means of a display and to offer a suitable organic EL device to one of the purposes. Moreover, this invention sets

to one of the purposes to offer the manufacture approach of an organic EL device that it can use for the lighting means of a display and a suitable organic EL device can be manufactured with the easily and sufficient yield, without complicating a manufacture process. Furthermore, this invention is equipped with the organic EL device concerning above-mentioned this invention, and a display is bright and sets to offer the display excellent in visibility to one of the purposes.

[0007]

[Means for Solving the Problem] (Organic EL device) The organic EL device concerning this invention In order to solve the above-mentioned technical problem, it has a support substrate and the component section prepared on this support substrate. Said component section An anode plate, It is the organic EL device which carries out the laminating of the luminous layer containing an organic electroluminescence ingredient, and the cathode to order, and includes them in it, and is characterized by equipping said component section with opening formed by penetrating said component section in order to penetrate and display the illuminated body of the organic EL device concerned, and the light-emitting part which illuminates said illuminated body. Opening which penetrates this component section in the component section by which the organic EL device of this invention equipped with the above-mentioned configuration was formed on the substrate is formed, and is the organic EL device with which the part which emits the illumination light among the component sections other than this opening was used as the light-emitting part. Thus, the permeability of the organic EL device in the transparency section for penetrating and displaying the illuminated body can be raised by opening which penetrates the component section being prepared. When it follows, for example, an organic EL device is arranged on the front-face side of a display and it uses as a lighting means, attenuation of the display light by the organic EL device decreases, and a clear display can be obtained by high brightness.

[0008] Next, in the organic EL device concerning this invention, it is desirable that said opening is formed by carrying out patterning of said component section. That is, in the organic EL device of the above-mentioned configuration, since the luminescence pattern is formed by carrying out patterning of the whole component section, it can respond also to modification of the luminescence pattern of a light-emitting part very easily, and is hard to produce the fault of a light-emitting part like before as compared with the case where carry out patterning of the specific layer and it is formed according to a luminescence pattern, and the organic EL device excellent in dependability can be offered.

[0009] Next, in the organic EL device concerning this invention, it is desirable that the plane area of said opening is made into 80% or more of the viewing area of the organic EL device concerned. Since according to the above-mentioned configuration a light-emitting part can consider as the organic EL device which cannot be easily checked by looking by the user while sufficient illumination intensity is obtained and having a high numerical aperture, the visibility which was excellent when it allotted the front-face side of a display can be acquired. In addition, the viewing area of the above-mentioned organic EL device points out the viewing area of a display, and the field within a substrate side, when the organic EL device concerned has been arranged in the front face of a display. Moreover, if area of said opening is enlarged excessively, since the brightness as a lighting means will fall, although the practical upper limit of said opening changes with brightness of the light-emitting part itself, it is about 90%.

[0010] Next, in the organic EL device concerning this invention, it is desirable that the configuration of said light-emitting part is made into the shape of the shape of a plane view abbreviation stripe and an abbreviation grid. When according to the above-mentioned configuration the illuminated body can be illuminated to homogeneity, the organic EL device of a parenthesis is penetrated and it displays said illuminated body, the organic EL device with which a light-emitting part (parts other than opening) is hard to be checked by looking can be offered. Moreover, although a configuration becomes complicated by making it the shape of an abbreviation grid, since luminescence area is expanded, brightness and homogeneity can be raised.

[0011] Next, the mounting terminal of a pair is formed in the component section side of said support substrate, one side of said mounting terminal is connected to the anode plate of said light-emitting part, and another side of said mounting terminal can consider the organic EL device concerning this invention as the configuration connected to said cathode through the flow electrode prepared along with the side-face side of said light-emitting part. Since the mounting terminal by the side of an anode plate and cathode is formed on the support substrate, also when preparing the protective group plate and protective layer for protecting a light-emitting part in the opposite side of a support substrate, for example according to the organic EL device of the above-mentioned configuration, there is no need of forming a mounting terminal in these protective group plates and protective layer side, the configuration above the component section can be simplified, and manufacture can be made easier. Moreover,

connection between said mounting terminal and an external drive circuit also becomes easy.

[0012] The organic EL device concerning this invention moreover, to said support substrate and opposite side of said component section The protective group plate is formed and the mounting terminal is formed in the inside [of said support substrate], and inside side of said protective group plate, respectively. The mounting terminal by the side of said support substrate inside, The anode plate of said light-emitting part is connected, and it can also consider as the configuration to which the mounting terminal by the side of said protective group plate inside and said cathode are connected. Since according to the organic EL device of the above-mentioned configuration it considers as the configuration which connects the mounting terminal on a support substrate to the anode plate arranged at a support substrate side, and connects the mounting terminal by the side of a protective group plate inside to the cathode arranged at a protective group plate side while pinching said component section with a support substrate and a protective group plate, a flow with an anode plate and cathode, and a mounting terminal can be performed most easily.

[0013] Or it can also consider as the configuration connected to said anode plate through the flow electrode in which, as for the organic EL device concerning this invention, a protective group plate is formed in said support substrate of said component section, and the opposite side, the mounting terminal of a pair is formed in the inside side of this protective group plate, one side of said mounting terminal was connected to said cathode, and another side of said mounting terminal was established along the side face of said light-emitting part. According to the organic EL device of the above-mentioned configuration, in order that there may be no mounting terminal in a support substrate side, formation of the component section to a support substrate top and formation of said opening by patterning of the component section become easy.

[0014] Next, in the organic EL device of the above-mentioned configuration, the resin layer which has conductivity and protection-from-light nature is formed in the outside of the cathode of said light-emitting part, and it can also consider as the configuration to which the mounting terminal of said cathode and said support substrate, or a protective group plate is connected through said resin layer. Since said resin layer can consider as the configuration which serves as the function as a flow electrode of a mounting terminal and cathode, and the protection-from-light function of a light-emitting part according to the above-mentioned configuration, structure is simplified and reduction of a manufacturing cost and

improvement in the ease of manufacture can be realized.

[0015] Next, in the organic EL device concerning this invention, it can consider as the configuration with which the resin ingredient of translucency was filled up into said opening. According to the above-mentioned configuration, the side edge side of the light-emitting part which touches opening can be protected by filling up opening with a resin ingredient, and the organic EL device equipped with the outstanding dependability can be obtained. When the alkaline-earth-metal layer is contained especially in the cathode of a light-emitting part, the problem that calcium of this alkaline-earth-metal layer etc. reacts with the oxygen in atmospheric air and moisture, and carries out conversion, and the life of an organic EL device becomes short may arise, but with the above-mentioned configuration, since it fills up with opening with said resin ingredient, the conversion of such an alkaline-earth-metal layer can be controlled.

[0016] (The manufacture approach of an organic EL device) Next, the manufacture approach of the organic EL device concerning this invention It has a support substrate and the component section prepared on this support substrate. Said component section An anode plate, It is the manufacture approach of the organic EL device which carries out the laminating of the luminous layer containing an organic electroluminescence ingredient, and the cathode to order, and includes them in it, and is characterized by including the process which forms said component section on a support substrate, and the process which forms opening of the predetermined configuration which penetrates said component section by carrying out patterning of said component section.

[0017] According to the manufacture approach of the organic EL device of above-mentioned this invention, since a manufacture process can be simplified, the ease of manufacture can be raised and that the increment in a man day only with one remarkable kind does not have etchant introduced into a process, either, since said opening is formed in a package at a predetermined pattern configuration after forming the component section etc. can also expect improvement in the manufacture yield by this. Therefore, the organic EL device which has opening with high permeability can be manufactured with the sufficient yield by the simpler production process. Although two or more etchant needed to be used for the detail and the effect of the etchant to other layers also needed to be taken more into consideration in it in order to form the light-emitting part which emits light in a conventional predetermined pattern configuration, and to etch only a specific layer By the manufacture approach concerning this invention,

since what is necessary is just to use one kind of etchant which can process each class uniformly as etchant to introduce in order to process the whole component section into a package rather than to process a specific layer alternatively, it can manufacture easily. Moreover, there is no need of controlling extent of etching by the manufacture approach concerning this invention with high precision since opening is formed so that said component section may be penetrated, and manufacture is easy. That is, that what is necessary is just to suspend etching, when a substrate front face is exposed to an opening pars basilaris ossis occipitalis, since it does not become a problem at all even if a substrate is etched somewhat, process control becomes very easy. Furthermore, in the component section formation process before the process which forms opening, since what is necessary is just to carry out laminating formation of each class which constitutes the component section on the whole surface at a support substrate top, also in this point, the simplification of a production process is realizable.

[0018] Next, the manufacture approach of the organic EL device concerning this invention It has a support substrate and the component section prepared on this support substrate. Said component section An anode plate, It is the manufacture approach of the organic EL device which carries out the laminating of the luminous layer containing an organic electroluminescence ingredient, and the cathode to order, and includes them in it. On a support substrate An anode plate, The process which forms the component section which carries out the laminating of a luminous layer and the cathode, and includes them, and the process which applies a photoresist on said component section, It is characterized by including the process which carries out patterning of the photoresist formed on said component section to a predetermined configuration, and the process which forms said opening by carrying out patterning of said component body section in accordance with the configuration of said resist. According to the manufacture approach of having the above-mentioned process, the luminescence pattern of the component section (light-emitting part) is formed by exposure by the photoresist, and development, by carrying out etching processing collectively from this photoresist side, in accordance with the configuration of a photoresist, precision can improve patterning, and the light-emitting part of the same configuration as a photoresist can be formed easily. In addition, in the manufacture approach of this configuration, although there is especially no limit in the thickness of a photoresist, if a photoresist is removed before opening is completely formed at the time of etching, since a part of component section which should be left behind essentially will be etched and fault will arise, the thickness of extent

which is not removed within the floor to floor time of opening is required. Moreover, if a photoresist is formed thickly excessively, the thickness of the manufactured organic EL device becomes large, and the problem of the process tolerance of opening falling may arise.

[0019] Next, in the manufacture approach of the organic EL device concerning this invention, said photoresist may be formed with the photopolymer ingredient which has conductivity and protection-from-light nature. According to this manufacture approach, the photoresist prepared in the component section bottom can be used as a flow electrode for connecting cathode and a mounting terminal, and an organic EL device can be manufactured more efficiently. That is, although the photoresist of a predetermined pattern is formed on the component section and opening is formed by etching the component section and a photoresist into a package by the manufacture approach concerning this invention, a photoresist remains on the left-behind component section (namely, light-emitting part) after formation of this opening. If the photoresist which remained on this light-emitting part has conductivity, a photoresist can be used as a flow electrode which connects a mounting terminal and cathode. Moreover, if the photoresist which remained on the light-emitting part has protection-from-light nature, since it can consider as the configuration whose photoresist of this serves as the protection-from-light layer usually formed in some cathode or the cathode bottom (a support substrate and opposite side), it can manufacture more easily by the ability simplifying the structure of an organic EL device.

[0020] Next, the manufacture approach of the organic EL device concerning this invention can also form said component section so that the mounting terminal formed on said support substrate may be covered partially or on the whole including the process which forms a mounting terminal on said support substrate. Since according to the above-mentioned manufacture approach the mounting terminal is beforehand formed on the support substrate and the component section is formed on it, where a mounting terminal and the component section are connected, patterning of the component section can be performed. Therefore, even if it carries out pattern formation of the component section, the problem of the drawer of wiring for a mounting terminal does not arise. The mounting terminal formed on this support substrate may prepare the mounting terminal linked to not only the mounting terminal linked to the anode plate arranged at the support substrate side of the component section but a support substrate, and the cathode arranged in the opposite side on a support substrate. In this case, although the mounting terminal linked to cathode will be covered with the

component section if the component section is formed all over a support substrate, connection between cathode and a mounting terminal is attained by removing the component section (or that part) which has covered the mounting terminal bottom connected with cathode at a subsequent patterning process, and exposing said mounting terminal.

[0021] Next, in the manufacture approach of the organic EL device concerning this invention, it is desirable to form said opening by the ion milling method in the process which carries out patterning of said component section. By performing patterning of said component section using the ion milling method, patterning of the whole light-emitting part can be performed with a very sufficient precision. The ion milling method is an approach of making the accelerated ion colliding with a workpiece and processing it, and since it is processible along with whenever [incident angle / of the ion to a workpiece (component section on a substrate)], it can form opening which has a perpendicular side edge side, for example for whenever [incident angle] to 0 degree (from a substrate normal to incidence), then a substrate. Moreover, the ion usually used by the ion milling method is an argon, and since conversion of the configuration member of the component section (and light-emitting part) is not carried out, the fault of the light-emitting part by pattern processing is not produced. Furthermore, since ion irradiation can be carried out to homogeneity in a substrate side even when performing patterning of the component section formed on the comparatively large-sized substrate according to the ion milling method, it can be said that manufacture effectiveness is high and is an advantageous approach industrially.

[0022] Or in the manufacture approach of the organic EL device concerning this invention, said opening can also be formed by the laser ablation method in the process which carries out patterning of said component section. The laser ablation method can also be used for patterning of the component section by the manufacture approach concerning this invention. The approach of starting is an approach of irradiating laser on the surface of a workpiece, evaporating the circumference of the irradiated section, and performing micro processing. Therefore, patterning of the component section can be easily performed by scanning a light-emitting part top by laser along with the pattern of opening to form, or carrying out laser radiation through an opening mask.

[0023] Next, the display concerning this invention is characterized by having with the lighting means which contains the organic EL device of a publication in either of previous, and a display means to use for a reflective display the light by which outgoing radiation is carried out

from this lighting means. According to the above-mentioned configuration, while illuminating said display means by high brightness, the reflected light from a display means can be made to be able to penetrate with high permeability, and the display equipped with a lighting means by which a clear display is obtained can be offered.

[0024] Next, as a display concerning this invention, said display means is used as a reflective mold liquid crystal display, and the cathode of said organic EL device which constitutes said lighting means can also consider as the display arranged corresponding to the non-opening field of said reflective mold liquid crystal display. Even when a front-face side is equipped with a lighting means to have an organic EL device according to the above-mentioned configuration, the numerical aperture of a liquid crystal display cannot fall and a bright clear display can be obtained.

[0025]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing.

(Liquid crystal display equipped with the organic EL device) As a display concerning this invention, the liquid crystal display which equipped the front-face side with the organic EL device is mentioned as an example, and this operation gestalt explains it. That is, the liquid crystal display of this operation gestalt is equipped with the organic EL device of this invention as a front light (lighting means). Moreover, the liquid crystal display excited with this operation gestalt is a reflective mold liquid crystal display of the active-matrix mold which used the thin film transistor (Thin Film Transistor, TFT) as a switching element.

[0026] The perspective view in which drawing 1 shows the outline configuration of the liquid crystal display of this operation gestalt, and drawing 2 are the fragmentary sectional views of the front light which meets the A-A' line of drawing 1 . Moreover, in the drawing referred to in this specification, in order to consider as the magnitude of extent which can check each class and each component, thickness, a dimension, etc. of each part are changed suitably and illustrated.

[0027] As shown in drawing 1 , the liquid crystal display 1 of this operation gestalt is equipped with a liquid crystal cell (display means) 2 and the front light (lighting means) 3 arranged at the front-face side, and is constituted. A liquid crystal cell 2 is a reflective mold liquid crystal cell of a active-matrix mold, opposite arrangement of the component substrate 4 and the opposite substrate 5 of the side in which TFT was formed is carried out, and the liquid crystal layer (not shown) is enclosed between these substrates 4 and 5. It is formed in the shape of a grid so that many

the source lines 6 and the gate lines 7 may intersect the inside side of the component substrate 4 mutually. Near the crossing of each source line 6 and each gate line 7, TFT8 is formed and the pixel electrode 9 is connected through each TFT8, respectively. That is, one TFT8 and the pixel electrode 9 are prepared every pixel 10 arranged in the shape of a matrix. In the liquid crystal cell 2 concerning this operation gestalt, this pixel electrode 9 consists of metallic materials of light reflex nature, and functions as a reflector. On the other hand, all over the inside side of the opposite substrate 5, one common electrode 11 is formed over the whole viewing area of the liquid crystal cell by which many pixels 10 have been arranged in the shape of a matrix. Moreover, although illustration was omitted, inside the liquid crystal cell 2, various wiring by the side of the inside of each substrate, the orientation film, etc. are formed.

[0028] As a front light 3 is shown in drawing 1, two or more plane view stripe-like light-emitting parts 21 are formed on the support substrate 16 of the transparence which consists of glass, transparence resin, etc., the gap of these light-emitting parts 21 and 21 is used as opening 35, and the component section 30 of the front light applied to this operation gestalt by these light-emitting parts 21 and opening 35 is constituted. And as shown in drawing 2, the protective group plate 36 of the transparence which consists of glass which countered with the support substrate 16 and has been arranged, transparence resin, etc. is formed so that said component section 30 may be pinched. Moreover, it fills up with the above-mentioned opening 35 with the sealing agent 32. The laminating of an anode plate 22, the electron hole transportation layer 23, the luminescence body layer 24, a buffer layer 25, the alkaline-earth-metal layer 26, a reflecting layer 27, the protection-from-light layer 28, and the resin layer 29 is carried out to order, and the light-emitting part 21 consists of support substrate 16 sides, as shown in drawing 2. Each class which constitutes these light-emitting parts 21 is formed in the respectively almost same thickness in two or more light-emitting parts 21. Moreover, the electron hole transportation layer 23, the luminescence body layer 24, and a buffer layer 25 constitute the luminous layer 37 concerning this invention among each class which constitutes a light-emitting part 21, and the cathode 38 which requires the alkaline-earth-metal layer 26 and a reflecting layer 27 for this invention is constituted. That is, the light-emitting part 21 consists of an anode plate 22, a luminous layer 37 formed on this anode plate 22, cathode 38 formed on the luminous layer 37, and the protection-from-light layer 28 and the resin layer 29 formed on cathode 38. In addition, although illustration was omitted, the mounting electrode of a pair which consists

of a metallic material is formed in the inside side of the support substrate 16, and it is electrically connected with an anode plate 22 and cathode 38 through flow material, such as direct or Ag paste and wiring material, respectively. And it connects with circumference circuits, such as a drive circuit where the component section 30 was formed in the exterior or the periphery of a front light 3, through these mounting terminals.

[0029] Hereafter, each class which constitutes a light-emitting part 21 is explained more to a detail. First, the anode plate 22 of a light-emitting part 21 is a transparent electrode which consists of transparence electrical conducting materials, such as ITO (indium stannic-acid ghost) and IZO (indium zincic acid ghost).

[0030] Next, the electron hole transportation layer 23 of a luminous layer 37 accomplishes the function to convey the electron hole poured in from an anode plate 22 to the luminescence body layer 24, for example, polyethylene dioxythiophene (conductive polymer) is constituted as a subject, and the thickness is set to about 0.05-0.2 micrometers. The luminescence body layer 24 consists of electroluminescence ingredients which make a subject for example, the macromolecule EL (electroluminescence: organic electroluminescence matter), and the thickness is set to about 0.05-0.2 micrometers. In the luminescence body layer 24 constituted from such a macromolecule EL, while being able to emit light by the low battery, luminescence of high brightness is realizable. In addition, as polymeric materials which constitute Macromolecule EL, a fluorene system macromolecule derivative, a poly para-phenylene vinylene derivative, a polyphenylene derivative, the poly fluorene derivative, a polyvinyl carbazole, the poly thiophene derivative, etc. can be used, for example. A buffer layer 25 can be constituted from an ingredient which functions as a buffer coat for promoting impregnation of the electron from the cathode 38 to the luminescence body layer 24, for example, makes LiF a subject, and the thickness is set to about 0.5-5nm.

[0031] Next, the alkaline-earth-metal layer 26 of cathode 38 is constituted considering alkaline earth metal, such as calcium or Mg, as a subject, and the reflecting layer 27 formed on the alkaline-earth-metal layer 26 consists of aluminum, Ag or these alloys, etc., and enlarges the quantity of light which goes to the support substrate 36 side with which the liquid crystal cell 2 which is the illuminated body is arranged by reflecting the light which emitted light by the luminous layer 37 by this reflecting layer 27. Thickness of this cathode 38 is set to about 0.1-0.5 micrometers.

[0032] Next, the protection-from-light layer 28 formed on cathode 38 is formed in order to intercept the reflected light by the side of the user

by the metal layer 27. It is desirable to constitute with the ingredient with which this protection-from-light layer 28 has conductivity at the front light 3 of this operation gestalt, for example, resin black, low reflective chromium, etc. are suitable as that component. And although the resin layer 29 formed on the protection-from-light layer 28 is not indispensable to the organic EL device which is the layer formed when the front light 3 of this operation gestalt is manufactured, and applies to this invention by the manufacture approach of the organic EL device concerning this invention mentioned later, when this resin layer 29 consists of black resists which distributed the resin ingredient which has conductivity and protection-from-light nature, for example, a carbon particle, the above-mentioned protection-from-light layer 28 can omit. Therefore, in the front light 3 concerning this invention, at least one side should just be prepared among the protection-from-light layer 28 and the resin layer 29.

[0033] The above-mentioned light-emitting part 21 and the opening 35 surrounded by the support substrate 16 and the protective group plate 36 are filled up with the sealing agent 32, and it can consist of resin ingredients of transparence etc. As for this sealing agent 32, it is desirable to constitute from an ingredient which has the highest possible permeability, and, specifically, the heat-curing resin of an epoxy system etc. can be illustrated as a suitable ingredient. In addition to the function as a jointing material for corrugated fibreboard to hold the protective group plate 36, the component section 30, and the support substrate 16 to one, the sealing agent 32 serves also as the function to protect a light-emitting part 21 from oxygen and the moisture in atmospheric air. Although it is easy to carry out conversion of it with atmospheric air or moisture since the chemical activity of especially the alkaline-earth-metal layer 26 of cathode 38 is high, by filling up opening 35 with this sealing agent 32, it can prevent such conversion and can carry out reinforcement of the front light. Furthermore, this sealing agent 32 also has the function to prevent reflection of the light by the side of the inside of the support substrate 16 and the protective group plate 36. Namely, although light becomes is easy to be reflected by these insides according to a refractive-index difference with the support substrate 16 and the protective group plate 36 since an air space is formed in opening 35 in not forming a sealing agent 32 Since change of the refractive index of the support substrate 16, a sealing agent 32, and a member while passing the protective group plate 36 can be made small by being filled up with a sealing agent 32, it can prevent that the visibility of a liquid crystal

display falls by reflection of light.

[0034] The characteristic point of the liquid crystal display 1 of this operation gestalt equipped with the above-mentioned configuration is in the point equipped with the opening 35 formed by penetrating the component section 30 of a front light 3. Although a liquid crystal cell 2 is illuminated, it is reflected with the pixel electrode 9 of a liquid crystal cell 2 and the liquid crystal display 1 of this operation gestalt displays by making the light which carried out incidence from the illustration inferior-surface-of-tongue side of a front light 3 penetrate through this opening 35 by making the light-emitting part 21 of a front light 3 emit light Since opening 35 penetrates the component section 30 and is formed, as compared with the front light of the conventional organic EL device, the permeability of the part which makes light penetrate can be made high. Therefore, it can become that it is hard to decrease while the reflected light of the liquid crystal cell 2 which is display light passes through the front light 3 interior, consequently the quantity of light of display light can be enlarged, and the liquid crystal display with which a bright display is obtained can be realized. Moreover, since do not make a front light 3 turn on, but outdoor daylight penetrates opening 35 in performing the reflective display using outdoor daylight, carry out incidence to a liquid crystal cell 2, it is reflected by the liquid crystal cell 2, opening 35 is penetrated again and it is displayed, by the time the outdoor daylight which carried out incidence to the liquid crystal display 1 reaches a user, opening 35 will be passed twice. Therefore, the effectiveness by having permeability with this high opening 35 will become remarkable by the case where a front light 3 is not made to turn on.

[0035] In the front light 3 concerning this operation gestalt, it is desirable that area in the plane view of opening 35 is made into 80% or more of the area of the viewing area of a front light 3. The plane region of the front light 3 arranged here at the front-face side of the viewing area (field where the pixel electrode 9 has been arranged) of the liquid crystal cell 2 indicated to be the viewing area of a front light 3 to drawing 1 is meant, and it is the same field as the viewing area of a liquid crystal display 1. In the viewing area of such a front light 3, while being able to obtain illumination intensity sufficient by making area of opening 35 into 80% or more, the display of a liquid crystal cell 2 can be made to be able to penetrate good, a bright display can be obtained, and, in a user, a light-emitting part 21 becomes is hard to be checked by looking further.

[0036] What is necessary is just to set the line breadth to 50 micrometers or less, when the light-emitting part 21 is formed in the shape of a

flat-surface look, in order to carry out a light-emitting part 21 that it is further hard to be checked by looking. In the line breadth exceeding 50 micrometers, although a light-emitting part 21 may be checked by looking by the operating environment, if it is 50 micrometers or less, in no operating conditions which can be assumed, a light-emitting part 21 will almost be checked mostly by looking. Moreover, as technique which a light-emitting part 21 makes be hard to be checked by looking, the technique of arranging a light-emitting part 21 may be adopted as the non-display field of the liquid crystal cell 2 besides detailed-izing of the above-mentioned line breadth. That is, as the source line 6 and the gate line 7 which were formed in the liquid crystal cell 2 in the shape of a grid are met, it is the technique of a light-emitting part 21 being made not to be arranged between the pixel electrode 9 which the reflected light produces in a liquid crystal cell 2 by arranging a light-emitting part 21 the shape of a stripe, and in the shape of a grid, and a user. According to this technique, a liquid crystal cell 2 can be illuminated without reducing the numerical aperture of a liquid crystal display 1, and it becomes possible to obtain a brighter display. Moreover, if a light-emitting part 21 is arranged in this way, since the black matrix is formed in the shape of a grid along with the source line 6 or the gate line 7, this black matrix and light-emitting part 21 will lap with a liquid crystal cell 2, and a light-emitting part 21 will become it is further hard to be checked by looking.

[0037] (The manufacture approach of an organic EL device) Next, the case where the front light 3 shown in drawing 1 and drawing 2 is manufactured as an operation gestalt of the manufacture approach of the organic EL device concerning this invention is mentioned as an example, and it explains below with reference to a drawing. Drawing 3 thru/or drawing 5 are the block diagrams showing the production process of the front light of this operation gestalt, and drawing 3 A - drawing 3 C, drawing 4 A - drawing 4 C, and drawing 5 A and drawing 5 B show a series of production processes in order of the process. Moreover, in these drawings, especially, as long as there is no notice, flat-surface process drawing in each process shall be shown in illustration left-hand side, and cross-section process drawing of the top view shown in illustration left-hand side shall be shown in illustration right-hand side. For example, in drawing 3 A, illustration left-hand side is flat-surface process drawing in the process concerned, and illustration right-hand side is cross-section process drawing which meets the B-B line of said flat-surface process drawing.

[0038] In order to manufacture the front light 3 shown in drawing 2 , the

support substrate 16 of the transparence which consists of glass shown in drawing 3 , transparence resin, etc. first is prepared, and the mounting terminals 17a and 17b which consist of aluminum, Au, etc. are formed on the support substrate 16. These mounting terminals 17a and 17b are made into the shape of a rectangle arranged along with two sides which the support substrate 16 counters, respectively as shown in drawing 3 . Next, as shown in drawing 3 B, the anode plate 22 which is an electrode which consists of a transparence electrical conducting material is formed on the whole surface on the support substrate 16 with which the mounting terminals 17a and 17b were formed. Subsequently, as shown in drawing 3 C, on an anode plate 22, laminating formation of the electron hole transportation layer 23, the luminescence body layer 24, a buffer layer 25, the alkaline-earth-metal layer 26, a reflecting layer 27, and the protection-from-light layer 28 is carried out on the whole surface, and the component section 30 is formed at order. And on the protection-from-light layer 28, a photoresist is applied and mask layer 29a is formed. In addition, each class which constitutes the above-mentioned component section 30 is formed by forming membranes using the same ingredient as each class which constitutes the light-emitting part 21 shown in drawing 2 .

[0039] Next, patterning of the mask layer 29a is carried out according to a photolithography process, and mask layer 29a of the configuration shown in drawing 4 A is formed. This mask layer 29a has two or more plane view rectangle-like pattern section 29b and opening 35a which were installed in that interior side by side while having a plane view rectangle (stripe)-like appearance. Moreover, in the process shown in drawing 4 A, the protection-from-light layer 28 is exposed on the component section 30 top face except mask layer 29a having been prepared. Next, as shown in drawing 4 B, Au, Ag, etc. form the flow electrode 33 which consists of a paste containing them along the illustration right-hand side side face of mask layer 29a. This flow electrode 33 is formed so that the protection-from-light layer 28 may be contacted. That is, the cathode which consists of an alkaline-earth-metal layer 26 and a reflecting layer 27, and the flow electrode 33 are electrically connected through the conductive protection-from-light layer 28 by connecting electrically the protection-from-light layer 28 which has conductivity, and the flow electrode 33. Next, patterning of the component section 30 is carried out to a predetermined configuration by etching mask layer 29a and the component section 30 by the ion milling method by irradiating argon ion from the upper part (component section 30 side) of the support substrate 16. As this

patterning process shows to drawing 4 C, the part covered with mask layer 29a and the flow electrode 33 among the component sections 30 is left behind, a light-emitting part 21 is formed, and the component section 30 of the part which is not covered at mask layer 29a is removed. Thus, while opening 35 is formed in the light-emitting part 21 inside, mounting terminal 17b is exposed to the periphery side of a light-emitting part 21 with a part of mounting terminal 17a covered with the component section 30. In the process shown in this drawing 4 C, although, as for the above-mentioned mounting terminal 17a, that part is exposed to the outside of a light-emitting part 21, the remainder is in the condition of having been covered with the light-emitting part 21, and is in the condition that mounting terminal 17a and the anode plate 22 of a light-emitting part 21 were connected electrically. On the other hand, in order that mounting terminal 17b may connect with the flow electrode 33 at the process mentioned later, the anode plate 22 is in the condition of having been estranged. Moreover, a part of mask layer 29a remains in the upper part of the protection-from-light layer 28, and it constitutes a light-emitting part 21 with each class which constitutes the component section as a resin layer 29. Since this resin layer 29 hardly affects the brightness and visibility of a front light and it needs to introduce a process complicated in order not to remove and to remove rather, it is good to leave the topmost part of a light-emitting part 21. However, since disadvantage, like the thickness of a front light becomes large arises when the thickness of the resin layer 29 is too large, the thickness of the resin layer 29 is good to be referred to as about 0.1-0.5 micrometers, and, for that purpose, it should just form it in suitable thickness beforehand with the formation process of mask layer 29a shown in drawing 3 C.

[0040] In patterning by the describing [above] ion milling method, argon ion is irradiated from the substrate 16 bottom at homogeneity, mask layer 29a and the component section 30 are etched in package, and formation of a light-emitting part 21 and opening 35 and exposure of the mounting terminals 17a and 17b are performed. Therefore, the protection-from-light layer 28 and the reflecting layer 27 of the bottom are etched, and an etching process has a possibility that fault may arise in actuation of a light-emitting part 21, when all mask layer 29a is removed before these mounting terminals 17a and 17b are exposed since it is set up so that it may stop, when the mounting terminals 17a and 17b are exposed. Therefore, mask layer 29a is formed in the thickness of extent which remains on the protection-from-light layer 28 with the formation process of mask layer 29a shown in drawing 3 C, when the mounting terminals 17a and 17b are exposed.

[0041] Next, as shown in the sectional view on the right-hand side of drawing 5 A, the protective group plate 36 for joining from the light-emitting part 21 bottom (the support substrate 16 and opposite side) is prepared. The flow electrode 39 and the sealing agent 32 are formed in the inside side (luminous layer 21 side) of this protective group plate 36. or -- a residual air-bubbles prevention sake -- these -- a luminous layer -- you may prepare in both further 21 top. Moreover, with the top view on the left-hand side of drawing 5 A, the protective group plate 36 and the sealing agent 32 are omitting illustration. It prepares in the location constructed between the flow electrode 33 by the side of the support substrate 16, and mounting terminal 17b where the protective group plate 36 is joined to the flow electrode 39 using the flow material of the shape of a liquid of Ag paste etc. which can be solidified, as shown in the top view on the left-hand side of drawing 5 A. A sealing agent 32 can consist of the same ingredients as the sealing agent 32 shown in drawing 2 , and can function as a jointing material for corrugated fibreboard which holds the protective group plate 36, a luminous layer 21, and the support substrate 16 to one, and insulating thermosetting resin and an insulating photo-setting resin can be used for it. Furthermore, in addition to the function as a jointing material for corrugated fibreboard, the opening 35 interior is filled up with this sealing agent 32, and it also has the function to protect a light-emitting part 21. That is, it prevents that each class which constitutes a light-emitting part 21 from intercepting the side face of a light-emitting part 21 with atmospheric air denaturalizes with oxygen and the moisture in atmospheric air. Therefore, as a sealing agent 32, airtightness is high and it is more desirable to use the stable ingredient which can intercept moisture.

[0042] Next, as shown in the sectional view on the right-hand side of drawing 5 B, the protective group plate 36 is joined from the light-emitting part 21 bottom. In this junction process, it deforms so that the flow electrode 39 by the side of the protective group plate 36 and the flow electrode 33 by the side of the support substrate 16 may be contacted in the top-face center section of the flow electrode 33, and a sealing agent 32 may subsequently enclose a light-emitting part 21 first and it may be filled up with the inside of the opening 35 of the light-emitting part 21 interior. Then, the flow electrode 39 is joined to the center section of mounting terminal 17b via the outside of the sealing agent 32 which turned to the lateral portion of a light-emitting part 21. In addition, with the top view on the left-hand side of drawing 5 B, the protective group plate 36 is omitting illustration. Thus, the front light which is joined to one with

a sealing agent 32, and requires the support substrate 16 and a light-emitting part 21, and the protective group plate 36 for this invention can be obtained. In the front light shown in drawing 5 B, while mounting terminal 17a contacts the anode plate 22 of a light-emitting part 21, it connects electrically, and it connects with the protection-from-light layer 28 of a light-emitting part 21 through the flow electrode 39 and the flow electrode 33, and mounting terminal 17b is electrically connected with the alkaline-earth-metal layer 26 and reflecting layer 27 which constitute the cathode of a light-emitting part 21.

[0043] The front light obtained according to the above process has the opening 35 which results in the support substrate 16 via a sealing agent 32 from the protective group plate 36 while a light-emitting part 21 has a predetermined pattern configuration and is formed, and by making a light-emitting part 21 emit light in accordance with a pattern configuration, it can indicate the illuminated body by transparency through said opening 35 while it can illuminate the illuminated body. And since opening 35 is filled up only with the sealing agent 32, this opening 35 can make light able to penetrate with very high permeability, and can obtain a clear display brightly.

[0044] In addition, although this operation gestalt explained the case where the mounting terminals 17a and 17b were arranged along with two sides which the support substrate 16 counters, respectively, the location of these mounting terminals 17a and 17b is not limited to the location shown in drawing 3 - drawing 5 , but can be suitably changed according to the design of a front light 3. For example, even when forming both mounting terminals on the support substrate 16, it can also arrange to a plane view abbreviation L type so that two adjoining sides may be met, and mounting terminal 17a connected with an anode plate 22 may be formed on the support substrate 16, and mounting terminal 17b connected to cathode 38 (protection-from-light layer 28) may be formed in the inside side of the protective group plate 36. Or both mounting terminals 17a and 17b are formed in the inside side of a protective group plate, and you may make it connect each to an anode plate 22 and cathode 38.

[0045] Moreover, the resin layer 29 (mask layer 29a) arranged at the topmost part of a light-emitting part 21 can be formed by the photoresist which has conductivity. Since the flow electrode 33 and the cathode which consists of a reflecting layer 27 and an alkaline-earth-metal layer 26 are electrically connectable even if it does not form such a configuration, then the conductive protection-from-light layer 28, a man day can be reduced and reduction of a manufacturing cost can be aimed at.

[0046] Moreover, although this operation gestalt explained the case where patterning of the component section 30 was performed by the ion milling method If patterning of this component section 30 is the processing approach that each class which constitutes the component section 30 is processible into a package, it is applicable satisfactory. For example, patterning of the component section 30 may be performed by the laser ablation method, and it is not necessary to necessarily prepare mask layer 29a shown in drawing 3 and drawing 4 in that case. In addition, any shall perform patterning of the component section 30 between the ion milling method and the laser ablation method should just choose the optimal processing approach with the pattern configuration to form. Since the ion milling method is excellent in respect of process tolerance, when forming a very detailed pattern configuration, specifically, it is good to use the ion milling method.

[0047]

[Effect of the Invention] As explained to the detail, as mentioned above, the organic EL device concerning this invention It has a support substrate and the component section prepared on this support substrate. Said component section An anode plate, Opening which was the organic EL device which carries out the laminating of the luminous layer containing an organic electroluminescence ingredient, and the cathode to order, and includes them in it, and was formed in said component section by penetrating said component section in order to penetrate and display the illuminated body of the organic EL device concerned, Having considered as the configuration equipped with the light-emitting part which illuminates said illuminated body can raise the permeability of the organic EL device in the transparency section for penetrating and displaying the illuminated body by opening which penetrates the component section being prepared. When it follows, for example, an organic EL device is arranged on the front-face side of a display and it uses as a lighting means, attenuation of the display light by the organic EL device decreases, and a clear display can be obtained by high brightness.

[0048] Moreover, according to the manufacture approach concerning this invention, have a support substrate and the component section prepared on this support substrate, and it sets to the manufacture approach of an organic EL device that said component section carries out the laminating of an anode plate, the luminous layer containing an organic electroluminescence ingredient, and the cathode to order, and includes them in it. By the process which forms said component section on a support substrate, and carrying out patterning of said component section By having

considered as the configuration including the process which forms opening of the predetermined configuration which penetrates said component section Since a manufacture process can be simplified, the ease of manufacture can be raised and that the increment in a man day only with one remarkable kind does not have etchant introduced into a patterning process, either etc. can also expect improvement in the manufacture yield by this.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Drawing 1 is the strabism block diagram of the liquid crystal display which is the gestalt of 1 operation of this invention.

[Drawing 2] Drawing 2 is the partial cross-section block diagram of the front light shown in drawing 1 .

[Drawing 3] Drawing 3 A-C is process drawing by the operation gestalt of the manufacture approach concerning this invention.

[Drawing 4] Drawing 4 A-C is process drawing by the operation gestalt of the manufacture approach concerning this invention.

[Drawing 5] Drawing 5 A and drawing 5 B are process drawings by the operation gestalt of the manufacture approach concerning this invention.

[Description of Notations]

1 Liquid Crystal Display (Display)
2 Liquid Crystal Cell (Display Means)
3 Front Light (Lighting Means)
16 Support Substrate
36 Protective Group Plate
30 Component Section
21 Light-emitting Part
35 Opening
22 Anode Plate
23 Electron Hole Transportation Layer (Luminous Layer)
24 Luminescence Body Layer (Luminous Layer)
25 Buffer Layer (Luminous Layer)
26 Alkaline-Earth-Metal Layer (Cathode)
27 Reflecting Layer (Cathode)
28 Protection-from-Light Layer
29 Resin Layer
32 Sealing Agent (Resin Ingredient of Translucency)